Intermontanus

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Newspaper Clippings

Man Killed While Trying to Kill Snake

Maryland — A 56-year-old Maryland man died after he accidentally shot himself in the face with a 12-gauge shotgun while trying to kill a snake outside his home according to the sheriff deputy's report. The detective reported, "[the victim] was struggling to move the slide [of the gun's] pump action. While the victim was chambering the second round into the shotgun, the trigger was accidentally pulled while [the gun] was in the upward position, pointed toward his head." [The Lexington Park, MD Enterprise, 28 July 1993. Reprinted from the *Vivarium* 5(3):5]

Pet Python Found in Orem Basement

PROVO, UT — A python lost by a previous tenant was found by the new tenant hiding under a furnace in an Orem, Utah basement. Animal control officers spent more than an hour extricating the 4.5-foot (1.4 m) snake prior to transporting it to the Orem Animal Shelter. [The Provo, UT Daily Herald, 13 August 1993. Reprinted from the *Vivarium* 5(3):5]

Creepin' Lizards! Snakes Cancel School

MIDLAND, SD — Calling off school because of heavy snow is common in rural Haakon County. But canceling classes because of heavy snakes?

"This is the first time that we've run into that type of problem," said school Superintendent Ted Kunz after a nest of rattlesnakes interrupted classes for the 14 students at the Kirley Road School.

It started when a girl reaching for her shoes in the school's cloak room came face to face with a full-grown rattlesnake. Some older boys at the school beat the snake to death with baseball bats, a shovel and a broom.

Forgetting a science test for the time being, the boys went to the schoolyard and killed four more rattlers. No snakebites were reported.

"We would have just enough time to get them to the nearest hospital, which for us would be Pierre," about 60 miles away, Mathis said.

The experience Monday left Mathis and parents rattled. They dug up a sidewalk in front of the school with a backhoe to find more than 30 bull snakes, rattlesnakes, and snake eggs. [The Cedar City/St. George, *Daily Spectrum*]

1993 Budget Summary

1992 Balance		$115.95
1993 Income		
	Membership dues	$292.00
	Donations	$53.00
Debits		
	Printing	$163.82
	Postage	$136.48
	Misc.	$8.28
Balance		$152.37

New Publications

The Chelonian Research Foundation announces a new scientific journal dedicated to the study of turtles and tortoises of the world, **Chelonian Conservation and Biology**. The primary aim of the journal is to serve as the official publication outlet of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group, but the goals extend beyond those guidelines to offer this journal as a potential publication outlet for all other scientific chelonian research as well. Contributions are therefore welcome from any individuals, and are not limited to members of the Specialist Group. We welcome all contributions dealing with any aspects of conservation or biology not only of freshwater turtles or tortoises, but also marine turtles. We are especially interested in any manuscripts dealing with conservation biology, systematic relationships, chelonian diversity, geographic distribution, natural history, ecology, reproduction, morphology and natural variation, population status, human exploitation, and conservation management. All manuscripts will be reviewed by the Editors and selected members of the Editorial Review Board, plus independent outside peer-review as necessary.

Chelonian Conservation and Biology will be published at least once a year, with a planned goal of at least two issues a year. Each volume will contain four issues. Subscriptions are $25/volume for individuals, $50/volume for institutions. Send Check or money order to: Anders G. J. Rhodin, Chelonian Research Foundation, 168 Goodrich Street, Lunenburg, MA 01462.

The contents of the first issue (published November 1993) are: Editorial: A new turtle and tortoise journal by J.L. Behler, P.C.H. Pritchard, and A.G.J. Rhodin; Conservation biology of the pig-nosed turtle, *Carettochelys insculpta* by A. Georges and M. Rose; Status and exploitation of the Madagascan big-headed turtle, *Erymnochelys madagascariensis* by G. Kuchling and R.A. Mittermeier; Distribution, osteology, and natural history of the Asian giant softshell turtle, *Pelochelys bibroni*, in Papua New Guinea by A.G.J. Rhodin, R. A. Mittermeier, and P.M. Hall; Carapacial pankinesis in the Malayan softshell turtle, *Dogania subplana* by P.C.H. Pritchard; On growth, sexual dimorphism, and the general ecology of the African spurred tortoise, *Geochelone sulcata*, in Mali by M.R.K. Lambert; Range extension for *Emydura subglobosa* in Papua New Guinea by A.G.J. Rhodin; A ranching project for freshwater turtles in Costa Rica by P.C.H. Pritchard; New localities for *Pyxis planicauda* in west-central Madagascar by J.L. Behler, Q.M.C. Bloxam, E.R. Rakotovao, and H.J.A.R. Randriamahazo; Reunion Island—still a land of tortoises by J.G. Gonzalez; and On the distribution, relative abundance and protection of tortoises in Bulgaria by V.A. Beshkov [1984], translation from Bulgarian arranged by J.R. Buskirk.

Hillsboro, Kansas — In the Western Hemisphere, the Cheyenne Bottoms in central Kansas is world famous as a way station for thousands of migrating waterfowl and a good place to watch birds of all kinds, but not much attention is given to the myriad of other creatures that call this wetland home.

The 27 kinds of reptiles and amphibians known to the Cheyenne Bottoms are featured in a new book published by Hearth Publishing of Hillsboro, Kansas, entitled, **Reptiles and Amphibians of Cheyenne Bottoms**. This is the first natural history field guide about the Cheyenne Bottoms vertebrates, showing stunning color

photographs of all kinds of salamanders, frogs, toads, turtles, lizards and snakes known to live in this important wetland.

Suzanne and Joe Collins of Lawrence, Kansas, have written this book to expand our knowledge and enjoyment of the Cheyenne Bottoms. They hope that this field guide about the area, featuring amphibians and reptiles, will enlighten people about these fascinating and misunderstood creatures.

This book, which initiates a series on the natural history of Cheyenne Bottoms, is the result of studies sponsored by the U. S. Fish & Wildlife Service, Western Resources, the University of Kansas Museum of Natural History, the Kansas Department of Wildlife and Parks, and the Kansas Herpetological Society.

Reptiles and Amphibians of Cheyenne Bottoms retails for $12.95 and may be ordered directly from Hearth Publishing, 135 N. Main, Box L, Hillsboro, KS 67063 (1-800-844-1655). (Add $2.00 S&H).

There is a new British herpetoculture magazine, **Reptilian Magazine**. The magazine is printed in full color and published monthly. Subscriptions are for twelve issues and cost $59.00 (about the same as *Vivarium* on a per issue basis).

The contents of the latest issue of **Reptilian Magazine** include: The captive husbandry of the royal python; introduction to the long-nosed tree snake; post-hibernation care of tortoises; herptile consultancy; and a new product review.

With the exception of a few noticeable typesetting errors, the magazine appears to be a fine contribution to the herpetoculture literature. Being a foreign magazine you can expect to see articles about animals not normally seen in the U.S. as well as many articles on the husbandry of North American species.

For more information write: Serpent's Tale, Natural History Books & Supplies, 464 Second Street, Excelsior, MN 55331, or call (612) 470-5008 for Visa/Mastercard orders. They sell single issues for $8.00, if you would like to review a copy before you subscribe. A copy of **Reptilian Magazine** will be at the next meeting.

The International Gecko Society recently published **Gekkonoid Lizard Taxonomy** by Arnold Kluge (245 pages). The book includes every gecko species (periodic updates will be available) and an extensive bibliography. To order a copy send $20.00 to the International Gecko Society, P.O. Box 370423, San Diego, CA 92137.

Utah Association of Herpetologists

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Assistant Editor: Cynthia Lleyson

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Send correspondence to: UtAH,
195 West 200 North,
Logan UT 84321-3905
(801) 752-0297

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Research Update

Peter Hovingh recently published another paper on the artesian springs of Tule Valley. Since this paper discusses the biogeography of the Bonneville basin and the ranid frogs, it may be of some interest to UtAH members. The abstract is presented here to give you a better idea about paper's content.

Peter Hovingh. 1993. Zoogeography and paleozoology of leeches, molluscs, and amphibians in Western Bonneville Basin, Utah, USA. Journal of Paleolimnology. 9:41-54

Abstract — The artesian springs of Tule Valley are similar to those of adjacent Snake Valley and Fish Springs Flat based on conductivity and temperature. All three valleys support Ranidae amphibians and the leech *Erpobdella punctata*. The artesian springs in Snake Valley and Fish Springs Flat contain six and two species of fish and contained up to 18 and 12 species of mollusk respectively, whereas Tule Valley artesian springs contain neither fish nor mollusks. The leeches *Helobdella stagnalis*, *Glossiphonia complanata*, and *Haemopis grandis* were found in Snake Valley whereas *Helobdella triserialis*, *Theromyzon rude*, and *Haemopis marmorata* were found in Tule Valley. These springs which were covered by Lake Bonneville to a depth of several hundred meters, 16000 BP., became isolated after the paleolake desiccated 13000 years BP. The marsh snail *Catinella* is found above the paleolake level in Snake and Tule Valley and has not penetrated to the valley floor habitats once covered by the paleolake, whereas another marsh snail *Oxyloma* has penetrated into these habitats in Snake Valley. The leech and molluscan distributions in Tule, Snake and Fish Springs Valleys suggest that the paleolake did not allow for much movement among the valleys, and successful passive aerial transport has not occurred after the paleolake desiccation 13000 years BP. Paleozoological models are proposed to explain the presence and absence of these species in Tule Valley. Both lateral movement (along paleolake shorelines) and vertical movement (to new habitats formed after the desiccation of the paleolake) by amphibians, mollusks and leeches is restricted in large terminal lakes and is species dependent in both spatial and temporal scales of the hydrological cycle.

Herpetological Employment, etc.

Southwestern Research Station Volunteer Program

Approximately 20 volunteer positions are open in 1994 at the American Museum of Natural History's Southwestern Research Station in Portal, Arizona. The volunteer program is run annually and offers students in biological sciences outstanding opportunities to observe and become involved with scientists doing field research. Food and lodging are provided to volunteers in exchange for 24 hours per week of routine chores, with the remaining time available for research activities.

The program is open to both undergraduate and graduate students; the latter may pursue their own research projects. Faculty knowing of promising students should alert them to this opportunity for professional experience toward, development of, and evaluation of their career goals.

Volunteers are needed between 15 March and 1 November. Appointments are for part of this period, with a minimum appointment of six weeks. Applicants for spring positions (March-May) should submit applications by 15 February, summer volunteers (June-August) by 1 April, and fall volunteers (September-November) may apply any time.

For applications, write: Dr. Wade C. Sherbrooke, Director, South-

western Research Station, American Museum of Natural History, Portal, AZ 85632. 602-558-2396.

National Biological Survey Seasonal Employment

POSITION TITLE, SERIES, GRADE AND SALARY: Biological Science Technician (Amphibians and Reptiles)*, GS-404-5 $8.79 per hour

*Approximately 8 positions will be filled from this recruit bulletin. These are temporary positions not-to-exceed one year but may be extended up to three years. Work is full-time with approximate employment dates of April 1, 1994 through September 30, 1994.

LOCATIONS: Point Reyes National Seashore, Yosemite National Park, Sequoia and Kings Canyon National Parks and Redwood National Park, California

BRIEF STATEMENT OF DUTIES: The incumbent will carry out surveys for amphibians and reptiles in National Parks throughout California. Surveys will utilize established techniques to locate, identify and record amphibian and reptile distribution and abundance in or near parks. Though the majority of time will be spent in the field, additional duties may also include literature searches for information regarding amphibian and reptile distribution, life history and survey/monitoring techniques. The incumbent may be required to perform basic data entry and statistical summaries in order to develop preliminary conclusions and make initial interpretation of results. Will assist, as directed by supervisor, with the preparation of project reports and other deliverables by performing basic report writing and word processing. The incumbent will also assist with the development of long-term amphibian and reptile monitoring program by assisting with writing periodic reports and by training park staff in both monitoring methods and in amphibian and reptile identification. Some positions will require the ability to carry heavy packs long distances into remote backcountry areas for up to a week at a time.

If you are interested in these positions you must hurry; the closing date is 27 January 1994. You can obtain a copy of the job announcement by calling Breck Bartholomew at (801) 752-0297 or (801) 584-1292, or by calling the National Biological Survey at Point Reyes National Seashore, (415) 663-8522.

Volunteers for Utah Amphibian and Reptile Surveys

There is a strong possibility that volunteers will be needed to help survey amphibians and reptiles in Utah. If you would like to contribute some time to these surveys contact UtAH. As projects come up your name will be given to the project leaders.

Reader Response

Dear Editor:

Our fascination for the Gila Monster (*Heloderma suspectum*), led us to read the feature article which appeared in the November 1993 issue of *Intermontanus* (The Impact of the Tuachan Development on the Gila Monster in Padre Canyon, Washington County, Utah) with great interest. The Gila Monster is perhaps the most unique vertebrate life form inhabiting the southwestern desert, and any effort toward its conservation and preservation of its habitat merits our compliment.

In Utah, the habitat of the Gila Monster is limited to a few pockets (ecological associations) of southwestern Washington County. The specific habitat of Gila Monster also is home to a number of other reptilian species found nowhere else in the state. Because of their limited habitat and distribution, many of these species (including the Gila Monster) have been afforded "protected" status by the Utah Division of Wildlife Resources. The Gila Monster also has been protected in all parts of its range (Arizona, California, Nevada, and Mexico), and is prohibited from international export without proper authorization (CITES treaty).

Since 1950 the population of Washington County has grown more than fivefold (from 10,000 to over 50,000 people), as the area has become the state's prominent tourist, retirement, and recreation mecca. Population growth, however, inadvertently has impacted the area's natural ecosystems. The area's plant and wildlife habitats have been subjected to increased pressure from the use of biocides, pesticides and other forms of pollution, roads and their accompanying vehicular traffic, off-road motorized vehicles, cattle grazing, mining, collecting and outright killing, hydrologic alteration, introduced vegetation, and mostly from the ongoing destruction of the natural habitat for farms and living space. Situations as the one presented in the recent article, where valuable habitat containing rare and protected species is about to be destroyed, leaves conservationists frustrated for solutions.

The observations presented in the paper demonstrate that a sizeable population of the Gila Monster still occurs in Padre Canyon. Since construction of the Tuachan project has already begun (certain areas have been cleared of rocks and brush), it is obvious that the building moratorium in effect in Washington County did not stop the project. Development in the canyon, thus may be

difficult to stop altogether, but there are actions we still may be able to take.

A starting point would be for interested parties to unite and petition appropriate authorities to initiate an aggressive campaign to educate the general public of the consequences human disturbance will have on the unique fauna and flora of the canyon. Focus should be placed on the Gila Monster and Desert Tortoise (two highly-visible and protected forms). Their plight should be conveyed to the general public through posted signs and the distribution of printed literature. Visitors to the canyon should be aware of how human intrusion will disrupt the delicate balance of nature; designated trails which least impact the area must be developed. These considerations will not guarantee the survival of the Gila Monster and other sensitive species in the canyon, but certainly will be a step in the right direction. Time will tell if the increased presence of humans in the canyon will allow the Gila Monster to maintain a viable breeding population.

There is no doubt that the development of Padre Canyon will have a negative effect on the population of Gila Monsters, but development alone does not necessarily dictate its local extinction. There are many populations of Gilas in Arizona and northern Mexico which not only have survived living in semi-disturbed areas, i.e., in partial association with humans, but surprisingly, appear to be thriving (Gordon W. Schuett and H.E. Lawler, pers. comm., LP pers. observ.). More importantly, the author recommends that the State of Utah Division of Wildlife Resources should undertake a "live-salvage" program, so as to provide these animals for research and/or relocation. State wildlife agencies often implement live-salvage programs for wildlife straying into urbanized areas, for sites which are to be flooded etc. Padre Canyon, however, is not an urbanized area, and construction of the amphitheater itself is not a major catastrophe. In our opinion, a random gathering (or collecting) program is not appropriate under the current circumstances. Removal of specimens would only exacerbate the reduction of the Gila Monster population in the canyon, and could seriously damage the nucleus of the breeding population. In addition, relocation of Gila Monsters to other areas may alter the genetic makeup of other populations, and should not be considered an option.

We feel strongly that increased public awareness of the consequences of human intrusion into these sensitive ecosystems, is the catalyst necessary to prevent further habitat alteration in these unique areas of Washington County.

Respectfully yours,

Robert Nohavec
Venom Research Lab
V.A. Medical Center

and

Louis Porras
Zooherp, Inc.

Point of View

Point of View: Some thoughts on Desert Tortoise Management

Ever since 1989, when the Mojave populations of the desert tortoise (*Gopherus agassizii*) were emergency-listed as endangered, several desert tortoise management practices have seemed shortsighted. The tortoise was granted emergency listing, and subsequent listing as threatened, because of a disease which has been killing tortoises off like flies. The disease, known as upper respiratory tract disease or URTD, has been found in many populations west and north of the Colorado River and appears to be spreading. Now, with the development of an assay which can determine which tortoises carry the URTD mycoplasma (*Mycoplasma agassizii*), I foresee yet another well-meaning but poorly conceived management practice: Testing wild animals and removing infected animals from the population.

First, let me present the abstract of the paper which discusses this new assay [emphasis mine] (Schumacher, I. M., M. B. Brown, E. R. Jacobson, B. R. Collins, and P. A. Klein. 1993. Detection of antibodies to a pathogenic mycoplasma in desert tortoises (*Gopherus agassizii*) with upper respiratory tract disease. Journal of Clinical Microbiology. **31**(6):1454-1460). "*Mycoplasma agassizii* (proposed species novum) is the etiologic agent of an upper respiratory tract disease in the desert tortoise (*Gopherus agassizii*), which is threatened in most of its range. An enzyme-linked immunosorbent assay (ELISA) for the detection of *M. agassizii*-specific antibodies in desert tortoises was developed with a monoclonal antibody with specificity for desert tortoise immunoglobulin light chain. Plasma samples from one group of tortoises were tested immediately before and 1 month after challenge either with nasal exudate containing *M. agassizii* or with a purified preparation of *M. agassizii*. Plasma samples from a second group of known healthy and sick tortoises were also tested. In the first group, the ELISA detected seroconversion in individual tortoises following challenge with *M. agassizii*. In the second group, ELISA results were positively correlated with the health status of the tortoises, as determined by clinical and pathologic findings. In addition, the ELISA revealed that tortoise antimycoplasma antibodies were specific for *M. agassizii* when samples were assayed against *M. agassizii*, *M. pulmonis*, *M. testudinis*, and *M. gallisepticum* antigens. **The observed direct correlation between the presence of nasal mucosal lesions and *M. agassizii*-specific antibodies proved that the ELISA reliably diagnosed *M. agassizii* infection in desert tortoises and advocates its use for monitoring *M. agassizii*-induced upper respiratory tract disease in free-ranging desert tortoises.**"

This paper only encourages the use of this assay to "assess the health status of desert tortoise populations threatened with URTD." It does not advocate the removal of infected tortoises from the wild. However, given the fact that tortoises have been (and may be still) removed from the wild because they have nasal discharge or because they are wheezy (both symptoms of URTD as well as many other tortoise ailments; Wright, K. 1993. Respiratory disease in captive tortoises. Reptile & Amphibian magazine. (November/December):43-46), I suspect this assay will be used to remove infected tortoises from the wild. But, why do I view this as a poor management practice?

If our management goal is to make sure the desert tortoise survives as a species for the next 100 years (a common length of time for conservation plans), then the removal of infected tortoises is probably fine, perhaps even a good policy. However, if our goal is to protect the tortoise from human-mediated extinction and allow it to survive for more than 100 years, this practice would be unproductive. In order for the tortoise to survive long-term we should allow

natural selection to run its course with minimal human involvement. This does not mean that we should just leave the desert tortoise alone, but that we should contemplate our management decisions rather than just doing what sounds good (especially if it only sounds good to the public). Letting natural selection run its course means we should allow those tortoises which are preadapted to survive this disease to live out their life in the wild even if this means other tortoises will be infected and die. By preadaptation I mean that some desert tortoises can survive the URTD infection and reproduce. Those tortoises that survive URTD infections because of their genetic makeup will pass these "URTD resistant" genes on to some of their offspring. And, in the long run the desert tortoise will be better off. Some people may argue that URTD will surely wipe-out the tortoise if it is not eradicated. I do not subscribe to this point of view and would cite that even in people with HIV some never get AIDS because they are apparently preadapted to deal with it.

In order to allow infected tortoises to remain in the wild yet insure the survival of the species, I would recommend the following management practices. We must continue to protect vast ecological communities which contain the desert tortoise as a primary herbivore. These areas must be large and should be managed for the community not for particular species. I believe habitat conservation plans (e.g., the one in Washington County, Utah) which are too tortoise oriented will not succeed long-term. We should also modify our policies regarding the removal (and relocation if it is reinstated) of tortoises from the wild (current policy removes tortoises from development sites and makes them available for research, adoption, or zoos). Once a tortoise is removed from the wild it is dead as far as the future of the species is concerned. I believe it would be better to require solid fences be built around development sites to prevent people and their pets from invading nearby tortoise habitat, then simply relocate the tortoises found within the development site to the nearby area, outside the fence. In most cases the tortoises would end up in a familiar area, often within their home range. This would allow a greater number of tortoises to remain in the wild and reproduce. It would also increase the chances of long-term survival of the tortoise. The assay would be used to monitor the disease in the wild, but not to interfere with its migration nor to remove infected animals from the wild.

Personally I find the current policies of removing tortoises from the wild because they are found in a development site or because they appear to have URTD simply astonishing. What other threatened/endangered animal is "hunted" by the agencies trying to protect it? The removal of animals from the wild, even if they are sick, does not seem to have any long term survival benefit to the species and I hope this assay will not be abused by well-meaning managers with short-term goals.

Submitted by **Breck Bartholomew**, 195 West 200 North, Logan, UT 84321.

HUSBANDRY & HERPETOCULTURE

HERPETOCULTURE AND CONSERVATION

These days, with conservation becoming more and more popular, herpetoculture is often associated with conservation. It's not uncommon to hear someone say, "we need animals in captivity so we can replenish wild populations when they become endangered." This reasoning is also used to fight against legislation prohibiting importation and/or collection of herps; "we need new blood lines to maintain genetically viable captive populations." Even professional herpetologists mention captive propagation as a conservation tool, but only when absolutely necessary and monitored by appropriate organizations (Dodd 1987; Dodd 1993). Since North American zoos only have room for about 16 snake species survival plans (Quinn and Quinn 1993; data for other amphibians and reptiles is not yet available), the possibility of letting herpetoculturists participate in conservation plans has been considered, and "studbooks" have been created for some species. Still other herpetoculturists have taken conservation into their own hands and claim to supplement their favorite herp population by releasing captive-bred offspring. All this effort seems to indicate most people believe this type of conservation will be successful. However, the only review of herpetological conservation plans (those including relocation, repatriation, and translocation in the plan) indicates that most conservation plans are unsuccessful (Dodd and Seigel 1991). All of the successful herpetological conservation programs (four crocodilians and one lizard species) have one thing in common; captive breeding programs are housed in or near the species range and in outdoor enclosures. The purpose of this paper is to examine if herpetoculture should play a roll in conservation.

Some may find it ironic that so many herpetoculturists claim to support conservation efforts when they also fight to be allowed to collect the very animals that need to be protected. Granted the wildlife agencies often do not have complete information on the amphibian and reptile species they are protecting, but they generally err on the side of conservation. Herpetoculturists, on the other hand, generally err on the side of habitat and species destruction.

Casual collectors who pick the occasional snake up off the road probably impact the population very little because the habitat is not destroyed. However, when road cruising is done in excess it can have a major impact on the population. For example, areas such as River, Baghdad, and Ajo roads are littered with collectors during the "herpin' season." Nearly every desirable herp that crosses the road is either collected or killed on these roads. In time these herp populations are depleted, especially along the roads. This has already happened to desert tortoises (*Gopherus agassizii*) and it appears rosy boas (*Lichanura trivirgata*) are facing the same fate (Yozwiak 1993).

Field collecting can be much more devastating to populations and habitat than road cruising. Feldner (1992) described an area with several herp species which was virtually destroyed by collectors using pinch or wrecking bars to move rocks. In less than one month the area went from sustaining an abundant herpetofauna to being deplete of nearly all herp species (Feldner 1992). Although Feldner's example may be extreme it is not entirely uncommon. Even in Utah, a state with relatively few herpers, there are areas where everything that can be lifted is turned and not replaced. This type of collecting impacts the entire ecosystem, not just the herps. Obviously, collecting is detrimental to wild populations, although there are instances when conservation may require collecting. In order for herpetoculturists to justify the claim of conservationism, the detrimental effects of collecting must be outweighed by the benefits of captive propagation and release programs.

For a captive propagation and release program to succeed, several biological constraints must be met. One of these biological constraints, perhaps the most important, is often overlooked. Ecologists know this constraint as Shelford's "law" of tolerance. In terms of conservation Shelford's law states the survival of an organism depends upon the completeness of a complex of conditions. Failure of captive propagation and release of an organism can be controlled by the qualitative or quantitative deficiency or excess with respect to any one of several factors which may approach the limits of tolerance for that organism (Odum 1971). Basically, unless all the physiological, psychological, etc. needs of an organism are met the animal will not survive and reproduce. The limits of tolerance, to these factors, are set both by genetics (the extreme limits) and acclimation (the immediate values). To illustrate this imagine a species which ranges from high to low altitudes. Throughout its range this species maintains a preferred temperature of 27°C, but individuals at high elevations are often exposed to cold temperatures and never exposed to

extreme high temperatures. These high elevation individuals become acclimated to lower temperatures than individuals from low elevations which are acclimated to higher temperatures. This may sound a bit confusing, yet the principle of Shelford's law is one that is intuitively obvious to most herpetoculturists.

Shelford's law explains why most wild caught animals die within a short time of capture. In the wild each individual is acclimated to a variety of factors within their genetic tolerance limits. When an animal is collected and placed in a human-controlled environment and some of these factors exceed what the animal is acclimated to (or the genetic limits) the animal becomes stressed and / or dies. In order for stressed animals to survive in captivity they must acclimate to their new environment and cope with all the symptoms of stress at the same time. One of the worst aspects of stress is a depressed immune system which makes the animal more susceptible to pathogens and parasites. The detrimental effects of the captive environment may not be immediately evident (see Oravecz 1993a-e for several examples of captive animals living months and years before dying because their physiological needs were not met).

Animals that do survive in captivity are domesticated to some degree. Kohane and Parsons (1988) stated, "under normal circumstances, domestication would initially involve selection for behavioral traits such as docility and early breeding..." As herpetoculturists we see this in many species. The Burmese python (*Python bivittatus*) illustrates both docility and early breeding in captive born individuals. The process of domestication acts on the individual as well as the captive population (Kohane and Parsons 1988; Price 1984). Therefore, the captive breeding stock for conservation projects have been artificially selected for an unnatural environment. This selection process is repeated in a less forgiving environment when the animal is again released into the wild. Shelford's law can explain why Dodd and Seigel (1991) did not find any successful conservation programs which involved breeding animals outside their native environment. To examine the herpetoculture-conservation relationship further we must consider the genetics of the captive population.

Because of the selection process involved when animals are removed from the wild, we know the captive population does not adequately represent the genetic diversity of wild populations. This genetic difference alone warrants the exclusion of releasing captives except in extreme cases (i.e., imminent extinction). However, there are other reasons why captives are not genetically suitable for release. Philosophically and ethically we must decide whether we should destroy the evolutionary history of populations by introducing unnatural genes and gene frequencies. Since most captive herps lack accurate locality data, we cannot make evolutionarily intelligent decisions as to where the animal or its offspring should be released. Sure we could ignore evolutionary history and assume that all populations are identical or that species survival supersedes population genetics and evolutionary history (as most mammalian conservationists have). However there are good reasons not to ignore these things as Templeton (1986) illustrated by the following:

> "...when the Tatra Mountain ibex (*Capra ibex ibex*) in Czechoslovakia became extinct through overhunting, ibex were successfully transplanted from nearby Austria (Greig, 1979). However, some years later, bezoars (*C. ibex aegagrus*) from Turkey and the Nubian ibex (*C. ibex nubiana*) from Sinai were added to the Tatra herd. The resulting fertile hybrids rutted in early fall instead of the winter (as the native ibex did), and the kids of the hybrids were born in February—the coldest month of the year. As a consequence, the entire population went extinct (Greig, 1979)."

A herpetological example of mixing animals from different populations was described by Reinert (1991):

> "On 14 July 1980, I released a telemetrically tagged adult (110 cm total length) male timber rattlesnake (*Crotalus horridus*) 18 km from its point of capture. Be cause this is greater than known maximal dispersal distances for the species (Reinert and Zappalorti, 1988; Reinert, personal observation), it can be assumed that this snake was displaced from its normal population, established activity range, and social group. On 4 August, the snake was found in the company of a native adult (106 cm) male rattlesnake (also telemetrically tagged). The two snakes remained together for 20 days and traveled, in association, a distance of 404 m. On two occasions, the native male was observed attempting to copulate with the translocated male. The latter snake appeared to exhibit a passive, subordinate attitude during these attempts.
>
> Of the several thousand social encounters that I have observed among native C. horridus in this population, these were the only instances of attempted male to male copulation. Twenty days also represents the longest observed period of male to male association during the active season. However, it is not unusual for male to female relationships to last this long and for associated movement to occur (H. Reinert personal observation). From the stand point of the population, it is important to note that neither snake was observed to encounter or mate with females during their 20 day period of association. This represented a substantial portion of the July / August breeding season during which both animals were reproductively dysfunctional. However, in the 2 wk prior to encountering the translocated male, the native male exhibited normal reproductive behavior (i.e., mate searching behavior and copulation)."

These two examples indicate that animals of unknown origin should not be used for conservation programs and that populations should not be mixed, but what about supplementing a wild population with captive bred animals from that same population?

At the level of herpetoculture, the release of captive produced animals into ancestral populations may sound fine, however from a genetic perspective this could prove devastating. Generally, the number of individuals collected from population is small compared to the total population size. Animals acclimated to their captive environment tend to put on weight faster after reproducing, thus they can reproduce again sooner. By releasing the captive born offspring the parents will be contributing an unusually high number of offspring to the population. In genetic terms the allelic frequencies will be weighted towards the captive population's allelic frequencies (which is not likely to adequately represent the wild population). The effect in the wild population is a higher rate of inbreeding, because of the proportionally high number of related (i.e., captive produced) individuals. In the long run, the population will suffer. In addition to the genetic effects, there are environmental effects. Burger (1990) found that incubation temperature effects the behavior of baby snakes. We can only speculate what the effect of captive incubation would be on animals released in the wild.

Inbreeding within the captive population is another reason why captive born animals are generally not suitable for release. Most herpetoculturists have bred siblings or know someone who has. In fact, it's not uncommon to purchase pairs or trios of siblings with the idea of breeding. The result of these breedings (e.g., inbreeding) is an increased probability of obtaining homozygous recessive alleles. These recessives are most notably seen as "cool" color patterns. Many of the morphs of corn snakes (Elaphe guttata), Burmese pythons (*Python bivittatus*), and California kingsnakes (*Lampropeltis getula*) are a result of inbreeding. The release of these animals in the wild would probably result in the animals death, but if the animal survived the genetics of the population would be artificially altered.

Finally, the risk of introducing pathogens and / or parasites into wild populations far exceeds the benefit of adding individuals to the population. Captive animals face the same stress because of acclimation to the natural environment that wild animals face when they become captives. As a result they are more likely to express pathogens that were hidden while in captivity. A good example of this is the desert tortoise (*G. agassizii*) which has been decimated by a disease purportedly introduced by released captives.

In their summary, Dodd and Seigel (1991) stated:"... our review casts doubt on the effectiveness of [relocation, repatriation, and translocation] programs as a conservation strategy, at least for most species of amphibians and reptiles." I would add that animals which are collected for private herpetoculture should not be used for

conservation programs (excepting education). In addition, animals collected for conservation programs should be maintained within or very near their native environment, preferably in large outdoor enclosures.

It seems too many herpetoculturists use conservation to promote their own interests. As Dodd (1987) wrote: "Too many propagation programs are operated under the guise of "conservation." When this really means to supply individuals with a sufficient number of pets, it is not conservation but recreational use of wildlife." That doesn't mean herpetoculturists cannot be conservationists, but private herpetoculture is not (or should not be) a conservation tool. Herpetoculturists can promote conservation in many ways, including:

1. Stop collecting wild animals and purchase only captive born animals. By purchasing only captive born animals you will not be directly supporting the collection of wild animals. In addition, you'll generally get healthier animals. All in all, captive born animals are a much better buy.

2. Encourage others to buy captive born animals. As herpetoculturists we are often asked to talk to groups about amphibians and reptiles. Invariably some one is interested in getting a herp as a pet and asks where they can get one. We should tell the group that we only keep captive born animals. This may sound odd, but remember the people you're talking to probably can't tell if the animal you're holding is wild caught. If the person does get a captive born animal they are more likely to have a good experience and want to continue keeping herps.

3. Obey, local, state, and federal laws when both keeping (and collecting, if you must) herps. Unfortunately many of our headaches today are caused by a few money hungry herpers who think they are above the law. The result of their greedy actions are stricter laws which ultimately encourage more people to break the law (and the cycle continues).

4. If you must collect, do it in an environmentally safe manner. First of all you should question why you must collect these animals, are your reasons valid? When collecting replace, to the best of your ability, everything you move.

5. Keep quiet about good herpin' sites. All too often herpetologists tell their friends about good herpin' sites, who tell their friends, who tell their friends... and eventually everyone knows about the area. Soon the area becomes a not-so-good herpin' area.

6. Do not release animals that have been in captivity, including newborns. The risk of introducing disease or detrimental genetic components is too high. This includes animals that were only kept for a couple of months. It would be better to donate the animal to a museum (with collection data) than release it. Only consider releasing an animal which has been kept for less than about two weeks and has been maintained in quarantine.

7. Finally, if you really want to contribute to conservation efforts, donate a proportion of your herpetoculture profits to an established conservation group which has herpetological projects. What better way to justify our hobby?

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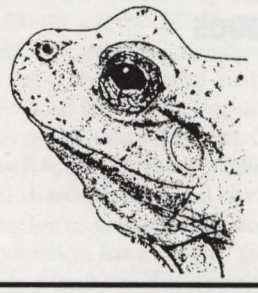
Submitted by **Breck Bartholomew**, 195 West 200 North, Logan, Utah 84321.



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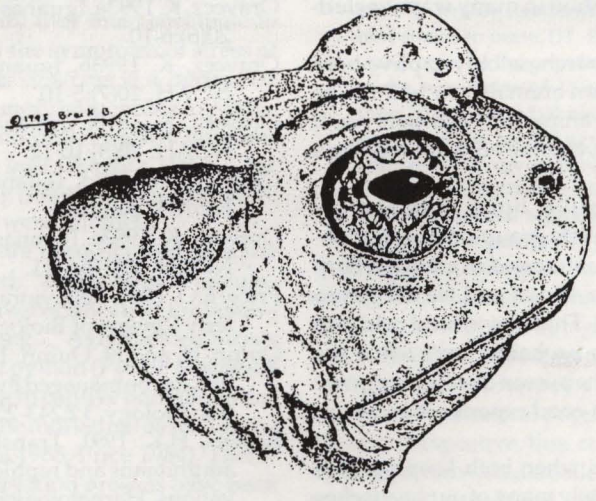
Wanted: Some one willing to write book reviews on the subject of husbandry and herpetoculture for *Intermontanus*. I'll supply the books if you'll review them. You must feel comfortable with your knowledge of the subject and writing. Contact Breck Bartholomew at (801) 752-0297 for more information.

NEXT MEETING: 27 January 1994 at 7:00 pm in room 212 of the University of Utah Biology Building. **Dr. Orlando Cuellar** will talk about his work on **The Ecology and Taxonomy of Spotted Frogs, *Rana pretiosa*, in Western Utah**. As you may remember, the spotted frog is becoming increasingly rare in Utah and is likely to be listed as federally endangered soon. After the talk there will be a drawing for the book "*Color Guide to Corn Snakes Captive-Bred in the United States*" and, of course, a desert tortoise T-shirt. There will also be a short workshop titled "How to read topographic maps" Participants will learn how to determine township, range, and section, as well as UTM and Lat-Long coordinates. NOTE: This time the talk will actually **start at 7:00.** This should be a really good meeting! **See you there!**



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